













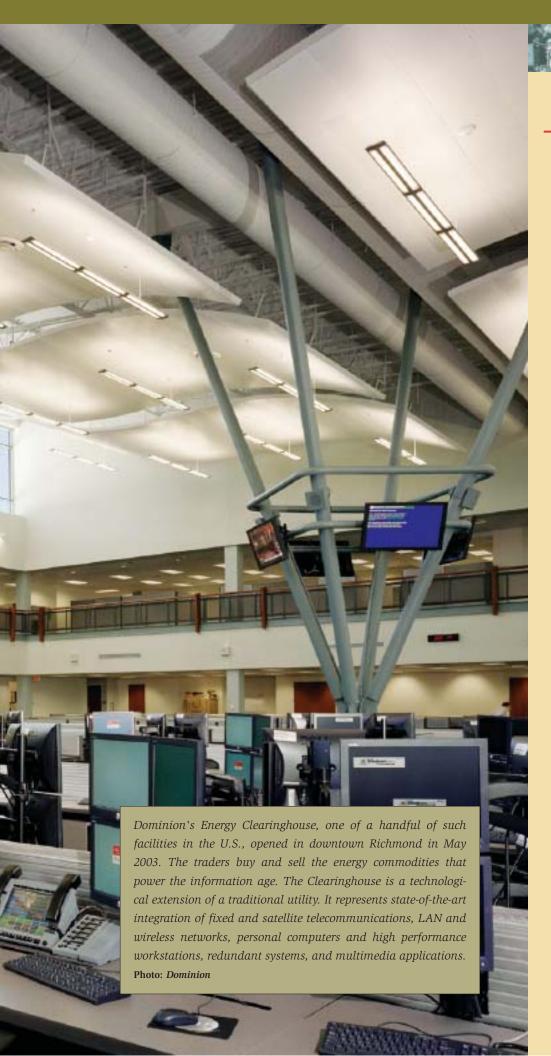
Chesterfield County

November 2003

# Technology in Greater Richmond

Greater Technologies. Greater Opportunities. Greater Richmond.





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Downtown Richmond night skyline.

Photo: Allen Jones, VCU Creative Services

# **Greater Richmond**

We're not the biggest or the cheapest, and not always the most obvious — but we're proud to be one of the best places in America to live and work.

We're not the size or price of Seattle, Boston or Atlanta, and maybe that's why life is different here in Richmond. We are strategically located at the mid-point of the East Coast and only two hours south of Washington, D.C. A million residents enjoy a kinder, gentler life where the average commute is 24 minutes and the river, mountains and ocean are a quick trip up or down I-95 or I-64.

We are a region that vigorously promotes and supports business and offers a solid infrastructure for growth and success. In a Right-to-Work state and with close to 200 foreign-affiliated firms, nearly \$5 billion has been invested by more than 250 companies over the past decade.

Today, new knowledge companies such as Capital One have surpassed all other private employers with more than 9,000 tech employees. The semiconductor and biotechnology sectors have made great strides in recent years as well. Technology is the fastest growing segment in central Virginia and a magnet for innovation, talent and new ideas.

Best of all, we have a quality of life unparalleled for cities our size. The fine arts, high arts, street art, community art and public art thrive here. The schools, both public and independent, are tops; the colleges and universities are poised to send educated workers your way; and the non-profit service industry is responsive and effective.

Build your business here and you'll find you get more. More for your money and more time to live life, stopping to enjoy a little Southern charm.

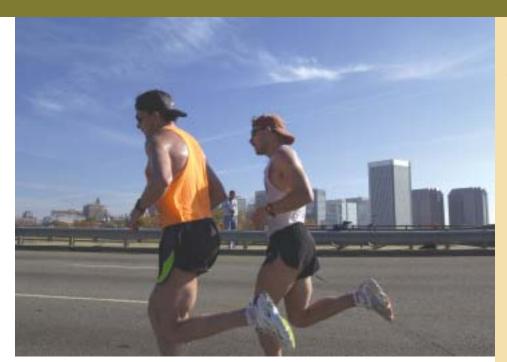


Photo: Richmond Sports Backers





Photo: River District Alliance

## Richmond: Easy To Love

# Here's what you get if you live and work in Greater Richmond

- A great quality of life, for much much less
- A 24-minute average commute
- A choice of affordable housing options ranging from historic homes to cluster contemporary, townhouses to farmhouses
- Urban living, suburban neighborhoods, rural communities, all within easy driving distance to commercial districts
- Spectacular architecture, glorious gardens
- A vibrant central city with new investments in the riverfront, a new Convention Center, an arts district and exceptional cultural amenities
- Really nice people
- Family-centered counties with bike paths, well-maintained parks and busy commercial and retail centers
- Some of the best public and independent schools in the nation
- A thriving arts, entertainment and music
- A broad range of religious and spiritual
- Less than two hours from the beach, the mountains and Washington, D.C.
- Moderate winters, glorious springs and falls, and a tolerable summer
- An hour's drive to Colonial Williamsburg, Charlottesville and University of Virginia, cottages on the Chesapeake Bay and James and Rappahannock rivers, and chalets at Wintergreen Ski Resort
- NASCAR
- Some of the country's most important and moving historical sites
- Two brand new shopping complexes with Nordstrom, Saks Fifth Avenue, Galyan's and Dillard's



## Technology Clusters in Greater Richmond

## **Build Your Business Here**

When Capital One surpassed Philip Morris as the region's largest private employer in 2000, technology officially became a major league player in the area's economy, and not just in information technology (IT).

Long a traditional base for pharmaceuticals and chemicals, Greater Richmond has made a steady shift towards bold high-tech innovation, with significant development in the area's semiconductor and biotech industries.

A national leader in e-government implementation, the Commonwealth's electronic procurement system was recognized this year as the State Government Innovator by MIT and Accenture's Digital Government Awards.

Technology will continue to drive Greater Richmond's economy into this decade and beyond.

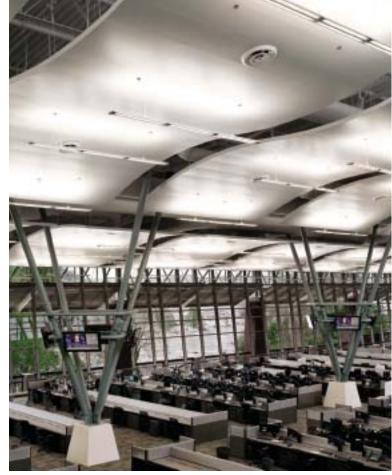


Photo: Dominion









# Information Technology & Telecommunications

Growth in the region's IT&T segment includes software development, infrastructure security, internet-based commerce and a broad spectrum of IT services. IT&T employs more than 12,000 workers in Greater Richmond and nearly 32,000 in the I-64 Corridor. If the hundreds of computer professionals in non-IT businesses are included in this count, the numbers swell dramatically.

The I-64 Technology Corridor stretches from Greater Richmond east along Interstate 64 to Norfolk and west to Charlottesville. All three metro areas are benefiting from the growth of technology industries in the corridor.

The largest employers of IT skills are major employers such as Capital One, the Federal Reserve System's central automation system, Media General, Owens & Minor, Circuit City, Dominion Resources, Philip Morris, GE Financial Assurance and Ethyl Corp.

Richmond-based IT services firms and highly developed telecommunications companies continue to provide the technology and expertise that keep the Commonwealth on the cutting edge.

Estimates of the Number of Employees in IT Occupations			
Occupation	1998	2008	
Computer engineers	1,005	2,170	
Systems analysts	3,572	6,358	
Computer programmers	2,139	2,947	
Computer support specialists	1,707	3,435	
Computer programmer aides	296	377	
Database administrators	326	596	
All other computer scientists	433	989	
Total	9,478	16,872	
Note: Data for Richmond-Petersburg MSA.			

Source: Virginia Employment Commission.

## Representative IT&T Companies

#### **AgilQuest**

Office hoteling systems (H)

#### **Capital One**

Consumer lending products

#### **CapTech Ventures**

E-business solutions (H)

#### Parikh Advanced Systems

Software development (H)

#### SyCom Technologies

Systems development (H)

#### Tridium Inc.

Framework, software, and services (H)

#### **Unimatrix International Corp.**

IT and telecommunications services (H)

#### Verizon

**Telecommunications** 

#### Whitlock ebs

Internet strategy and web development (H)

#### **World Investor Link Inc.**

Investment information and web casting

#### Legend for Representative Company Operations

(H) - Headquarters

(M) - Manufacturing

(R) – Research and development

(S) – Sales and service



# Advanced Materials / **Specialty Chemicals Manufacturing**



#### **DuPont Teijin Films**

Polyester polymer and film (M)

#### E.I. duPont de Nemours

Specialty fibers including Kevlar®, Teflon®, and Nomex®; Zytel®; and plastics (M, R)

#### Eternal Technology Corp.

Photoresist film for printed circuit boards (M)

#### Ethyl Corp.

Petroleum additives (H, R, S)

#### Hercules Inc.

Specialty chemicals (M)

#### Honeywell Inc.

High performance fibers including Spectra® (M, R)

#### **Magellan Systems International**

M5® fiber (M, R)

#### Wako Chemicals USA

Specialty chemicals and diagnostics (M, R)

#### **Legend for Representative Company Operations**

- (H) Headquarters
- (M) Manufacturing
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- (S) Sales and service





Ethyl Corporation mechanical laboratory (left) and benchtest (right). The company consolidated its fuel additive research and development in Richmond in 1994.

Photos: Ethyl Corporation

Richmond is renowned for manufacturing superior high performance fibers and materials, in an arena where 24/7 operations are the norm. Advanced materials / specialty chemicals manufacturing is the area's second largest technology cluster, with employment of more than 6,700. Employment for the I-64 Corridor in this cluster is nearly 8,000. These figures include a significant number of engineers and other research professionals at research centers for major corporations including DuPont, Honeywell and Ethyl.

Long a home of these three industry giants, Greater Richmond is also enjoying exciting new growth in chemical manufacturing with the addition of firms such as Eternal Technology Corp. and Mitsubishi Gas Chemical Co.

A number of high tech polymers and fibers are developed and manufactured here, including DuPont's Kevlar® and Honeywell's Spectra®. The newest addition to this suite of high tech materials is M5®, developed by Magellan Systems International. Stronger than steel and highly resistant to impact, damage and fire, M5 is ideal for uses ranging from military vehicles and lightweight body armor to firefighter clothing and tethering applications.

# **Electronics & Microelectronics Manufacturing**







When Motorola and Siemens formed a partnership to build a state-of-the-art, 200mm semiconductor fabrication facility in eastern Henrico County in 1996, it signaled the emergence of the Silicon Dominion and placed Greater Richmond in the mainstream of this dynamic industry.

Now wholly owned by the German parent Infineon Technologies, the fab is shipping 64M, 128M, and 256M DRAM chips using technologies as small as .17 um. A second fab shell is ready to accommodate 300mm manufacturing when market conditions warrant. With some 1,700 workers and more than 65 supporting companies, as well as a number of electronic component and connector manufacturers, Infineon is the cluster's largest employer.

There are more than 7,800 workers in this cluster in the I-64 Corridor, including both U.S. and international firms making semiconductors and a variety of other electronic products. Greater Richmond employs some 2,500 electronics cluster employees.

# Representative Electronics & Microelectronics Companies

#### **Electronic Manufacturers Corp.**

Circuit boards, electromechanical assemblies (M)

#### **ERNI Components Inc.**

Electronic DIN connectors (M)

#### **Hewlett Packard**

Laser jet printers (M)

#### **Infineon Technologies**

Semiconductor wafers (M)

#### Lumberg Inc.

Electrical and electronic connectors (M)

#### Tokvo Electron

Semiconductor equipment (S)

#### **Rockwell Automation**

Electrical and electronic connectors (S)

#### Legend for Representative Company Operations

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## Representative Biotech, Pharmaceutical & Life Sciences **Companies**

Boehringer Ingelheim Chemicals Inc.

Pharmaceuticals (M)

Boehringer Ingelheim Pharmaceuticals Inc.

Pharmaceuticals (R)

Commonwealth Biotechnologies Inc.

Contract research (H, R)

Hemodyne Inc.

Hemostatis diagnostics & instrumentation (H, R)

**INSMED Pharmaceuticals** 

Therapeutics for diabetes (H, M, R)

Molecules for Health Inc.

Anticancer and antiviral agents (H, R)

**PPD** Development

Drug discovery and development (R)

Wyeth

Over-the-counter products including Advil®, Dimetapp®, and Robitussin® (M, R)

Legend for Representative Company Operations

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Commonwealth Biotechnologies Inc., located in Chesterfield County, provides comprehensive biotechnology research and development analytical services on a contract basis.

Photo: Commonwealth Biotechnologies Inc.

## Life Sciences

Thanks in part to the 34-acre Virginia BioTechnology Research Park, the region has experienced a burst of growth in the life sciences field. The Park houses Virginia's first technology incubator and has already helped launch more than 50 new technology companies.

Current tenants are engaged in a variety of business and research activities, including medical diagnostics, drug development, environmental quality, forensic science and medicine, systems development and consulting.

The life sciences/biotech/pharmaceutical cluster has employment of more than 3,500 in Greater Richmond and more than 8,400 in the I-64 Corridor.

The industry includes production and research operations for major manufacturers including Wyeth Boehringer Ingelheim, plus an increasing number of smaller biotech R&D operations.

This cluster's employment includes a mix of skilled production workers and experienced research professionals. Wyeth (formerly Whitehall Robins) relocated all research for its over-thecounter drugs to Greater Richmond in 1995. In 2001, Boehringer Ingelheim Pharmaceuticals Inc. opened a research and development facility in downtown Richmond's Virginia BioTechnology Research Park.

# **Advanced Industrial Manufacturing**

The historical success of many Greater Richmond industries is rooted in their ability to embrace innovation, inventions and the application of new technologies. The manufacture of cigarettes represents the fusion of electrical and mechanical machinery to create equipment that can produce 16,000 cigarettes per minute. These technologies combine American, German, Italian and British ingenuity and creativity. Other industries such as consumer aluminum products or power generation systems have thrived on the

ability of Richmonders to apply and capitalize on new technologies and practical applications.

The industrial manufacturing cluster employs more than 2,000 in Greater Richmond and 4,500 in the I-64 Corridor. The cluster includes U.S. and international firms making a broad range of products from bearings to turbines and specialized industrial machinery. This cluster's labor force includes a mix of highly skilled machinists, production workers and technicians.

Flexicell, in Hanover County, designs and manufacturers custom robotic systems that provide packaging and palletizing solutions for a wide range of products. Photo: Flexicell, Inc.

## Technology Clusters SIC = Standard Industrial Classification

## **Specialty Chemicals** Crude petroleum & natural gas . . . (SIC 131) Industrial inorganic chemicals ... (SIC 281) Plastic materials & synthetics .... (SIC 282) Paint and allied products ..... (SIC 285) Industrial inorganic chemicals ... (SIC 286) Agricultural chemicals ..... (SIC 287) Miscellaneous chemical products . . (SIC 289) Petroleum refining ..... (SIC 291) **Advanced Industrial Manufacturing** Engines & turbines ..... (SIC 351) Special industrial machinery . . . . . (SIC 355) General industrial machinery .... (SIC 356) Measuring & controlling devices . . (SIC 382) Photographic equipment & supplies ..... (SIC 386) Engineering & Architectural Services Engineering & architectural services ..... (sic 871)

## **Electronics** Computers & office equipment ... (SIC 357) Electrical distribution equipment .. (SIC 361) Electrical industrial apparatus . . . . (SIC 362) Electronic components & accessories ......(SIC 367) Miscellaneous electrical machinery . . . . . . . . . . . . (SIC 369) Life Sciences Drugs ..... (SIC 283) Medical equipment, instruments, & supplies . . . . . (SIC 384) Research development & testing services ...... (SIC 873) Information Technology & Telecommunications Telephone communications ..... (SIC 481) Computer & data processing services . . . . . . . . . . . . . . . (\$10 737)

## Representative Advanced Manufacturing Companies

#### Alstom Power Inc.

Power generation equipment (M)

#### Brenco Inc.

Tapered roller bearings (M)

#### Flexicell Inc.

Robotic packaging equipment (M)

#### Franz Haas Machinery

Baking machinery (M)

#### **G.D. Packaging Machinery**

Packaging machinery (M)

#### Hauni

High-speed production equipment (M)

#### Inta-Rota Inc.

Paper industries machinery (M)

#### **Jewett Automation**

Custom factory automation (M)

#### Legend for Representative Company Operations

- (H) Headquarters
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## The Workforce

# A Million Strong and Counting

Central Virginia is at the crossroads of two major highways, I-95 heading north and south and I-64, which runs east and west from Hampton Roads to Charlottesville and beyond.

Greater Richmond, the state capital, is the hub, with a population of more than one million. Total employment in 2002 reached 545,000, and the I-64 Corridor, with a total population of 2.7 million, employs 1.3 million strong.

The Richmond-Petersburg MSA is a magnet for labor and draws commuters from 40 localities statewide. There is net in-commuting of 21,000 workers. Unemployment in the MSA is historically less that the state and national rates. However, a recent monthly rate of 4 percent translates to 20,000 unemployed persons available as a source of labor for a new or expanding company.

Virginia is the northern-most Right-to-Work state. Greater Richmond and the Commonwealth have significantly low levels of unionization and union election activity. Less than 1 percent of the metro area's 27,600 private business establishments are known to be unionized (130 manufacturing and service businesses).

Around 5.5 percent of the private sector workforce is unionized (19,000 union members). No office-intensive operation is known to be unionized. Work stoppages are few in number and usually part of a nationwide or statewide action.

Each year, more than 9,000 students graduate from Greater Richmond's 38 pubic high schools. Another 7,000 earn post-secondary degrees from the metro area's 10 institutions of higher education. These graduates are the largest continuing source of labor for the future.







Photo: Virginia BioTechnology Research Park



VCU Medical Center researchers.

Photo: Allen Jones, VCU Creative Services

## **Employment by Technology Cluster**

Technology Cluster	Richmond Metro	1-64 Corridor
IT & Telecommunications	12,387	31,768
Specialty Chemicals Manufacturing	6,766	7,918
<b>Biotech and Pharmaceuticals</b>	3,580	8,444
Electronics and Microelectronics Manufacturing	g 2,487	7,856
Advanced Industrial Manufacturing	2,177	4,519
Other	4,404	17,966
Total Technology	31,801	78,471
Total All Industries	545,331	1,319,320
Tech % of Total	5.8%	5.9%

Notes: Data for Second Quarter 2002. Other includes Engineering and architectural services and Defense related industries.

 $Sources: \ Chmura \ Economics \ \& \ Analytics \ and \ Virginia \ Employment \ Commission.$ 



The Federal Reserve Bank of Richmond employs more than 1,600 in downtown Richmond.

Photo: Allen Jones, VCU Creative Services



# An Urban Powerhouse Leads the Way



The meteoric rise of Virginia Commonwealth University (VCU) as one of the nation's top urban universities has been, by all accounts, stunning. Under the leadership of the dynamic Dr. Eugene P. Trani and with strong civic and business support, a small city commuter college recast its direction and

emerged as one of the country's true educational power-houses and great urban institutions.

VCU is transforming the region, inspiring a new generation of creative, innovative thinkers, in technology, medicine and the sciences, engineering, arts and business.

Some things you should know:

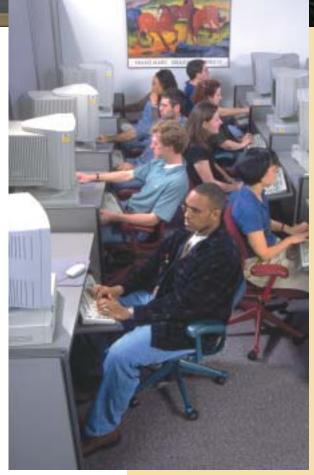
- The 2002 Nobel Prize for Chemistry was awarded to Professor John B. Fenn and two colleagues for a pioneering technique called electrospray ionization.
- VCU was honored to receive a 25 percent increase in externally funded research awards in FY 2001–2002. Some \$169 million, primarily from federal funds, supports local research and is awarded primarily from the National Institutes of Health. Some 10 percent comes from private industry.
- VCU is ranked by the Carnegie Foundation as one of the nation's top research universities.
- U.S. News & World Report has ranked 20 of VCU's graduate and professional programs as among the best of their kind in the nation.



Photos: Allen Jones, VCU Creative Services



- VCU is the top developer in downtown Richmond, investing more than \$600 million in real estate development in the past 12 years.
- A 2002 study by CEO's for Cities and the Initiative for a Competitive Inner City profiled VCU as an instructive example of an urban university playing a leadership role in local and regional economic growth.
- VCU enrolls nearly 27,000 students in more than 160 undergraduate, graduate, professional, doctoral and post-graduate certificate and degree programs at 11 schools and one college. Dorm capacity has increased by 50 percent over the past three years.



Photos: Allen Jones, VCU Creative Services



VCU School of Engineering building (back and right) and Virginia Microelectronics Research Center (foreground). Photo: Allen Jones, VCU Creative Services

# The School of Engineering

An exemplary model of collaboration between the university and the industrial and business community is VCU's School of Engineering. Thanks to substantial support from the state and local business community, this school was established in 1996 in response to workforce and economic development needs of Richmond and central Virginia.

The school's trustees are the presidents and top officials of major manufacturing, business and financial organizations in Virginia, including Infineon Technologies, Wachovia Bank, Dominion Energy, Alcoa Flexible Packaging, Carpenter Company, Albemarle Corp, CarMax, Alfa Laval, SunTrust Bank and Philip Morris.

The educational approach stresses creativity, industry partnerships, strategic research, understanding of business and communication skills. Today, the Engineering School has nearly 1,100 undergraduate students and 140 graduate students. The Engineering School offers the following degree programs:

- B.S. in Chemical, Electrical, Mechanical, Biomedical and Computer Engineering plus a multidisciplinary concentration in microelectronics
- M.S. and Ph.D. in Engineering (with emphasis in Life Sciences, Manufacturing and Design, and Micro-Nano Technology) and in Biomedical Engineering
- B.S., M.S. and post-baccalaureate certificate in Computer Science. The B.S. in Computer Science is a rigorous, highly concentrated curriculum accredited by the Computing Accreditation Commission of ABET. A Ph.D. program in computer science is planned.



# Virginia Microelectronics Research Center

This 27,000-square-foot, four-story building dedicated to microelectronics and nanoelectronics research and education, is located in the School of Engineering. The first floor is devoted to silicon technology and undergraduate education and includes a 5,000-square-foot class 1000 cleanroom.

Motorola donated \$6 million of equipment for the silicon-processing lab. Sponsored research for new materials and devices is conducted on the third floor, which has approximately 2,500 square feet of class 1000 space. The laboratory receives new tools continually.



Semiconductor equipment donated by Motorola.





Joseph Butcher and his "Skybot" tracking robot at the 2003 Senior Design Showcase.



Students launch model rockets as part of learning the principles of fluid dynamics.

Photos: VCU School of Engineering, www.vcu.edu/egrweb





VCU Rice Center property. Photo: Allen Jones, VCU Creative Services





Roof-top 3,000 square-foot greenhouse of the Trani Center for Life Sciences is a research-grade facility that can control temperature, humidity and light.

## **VCU** Life Sciences

The Inger and Walter Rice Center for Environmental Life Sciences, a gift to the university in 2000, encompasses 272 acres of land and a 70-acre lake on the James River east of Richmond. Located on one of the nation's most ecologically and culturally significant rivers, the property is rich in wildlife and natural resources. This living laboratory will be the headquarters of the Virginia Rivers Initiative for research and scholarship in large river ecosystems.

The new \$28.1 million, 132,000-square-foot Eugene P. and Lois E. Trani Center for Life Science houses the Center for Environmental Studies, the Center for the Study of Biological Complexity, a satellite lab of the Nucleic Acid Research Facility, the Bioinformatics Computational Core Laboratory Suite, the Department of Biology and the Office of the Vice Provost for Life Sciences. The building features 17 undergraduate instructional labs and 44 research labs.

The Life Sciences Initiative is a comprehensive undergraduate and graduate program with a unifying vision of the interrelationships among the biological components of life—from genes to ecological environments to human behavior.

It brings together outstanding faculty from the university's academic and health science campuses and features flexible curricula comprising biology and chemistry, engineering and mathematics, medicine, technology and physics.





# The School of Business

With considerable support from area businesses including Dominion, Verizon, Whitlock ebs, Infineon Technologies, James River Technical and the Federal Reserve Bank of Richmond, VCU's School of Business offers a variety of business, economics, real estate and information systems programs, all of which are fully accredited by the AACSB—International Association for Management Education.

Specifically, the school offers Bachelors, Masters and Ph.D. degrees in Business with a major in Information Systems, as well as a post-baccalaureate certificate in Information Systems for students who have earned a bachelor's degree in another field.

The Department of Information Systems' BS program was recently accredited by the Computer Accreditation Commission of ABET, the Accreditation Board for Engineering and Technology, Inc. VCU is one of six charter schools in the nation to receive this distinction for an undergraduate program and is the only school with the program in the Business School.

A recently-approved Master of Science in Information Systems degree and a technology-focused MBA program also reflect the school's emphasis on the use of technology in business management decision making.

In the Business School's Department of Information Systems, the Information Systems Research Institute provides complete information technology services from applied research, consulting and advisory services to workforce training and development. ISRI can also provide students to supplement a company's existing IT staff on a temporary or an ongoing basis.

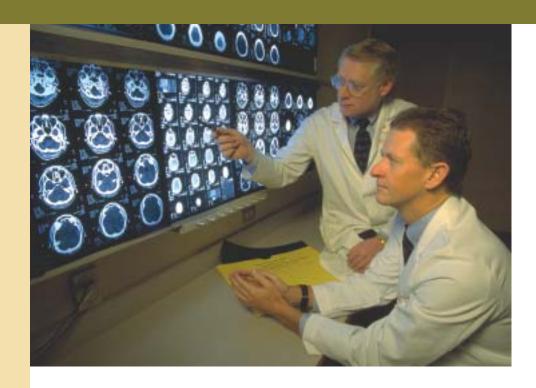


Photos: VCU School of Business



MCV Hospitals Gateway Building (above) and School of Medicine, Department of Surgery, Division of *Neurosurgery* (above right).

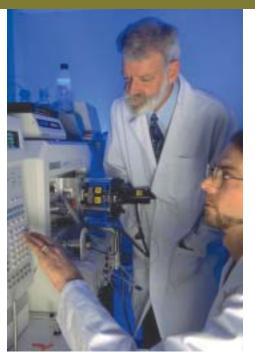
Photos: Allen Jones, VCU Creative Services

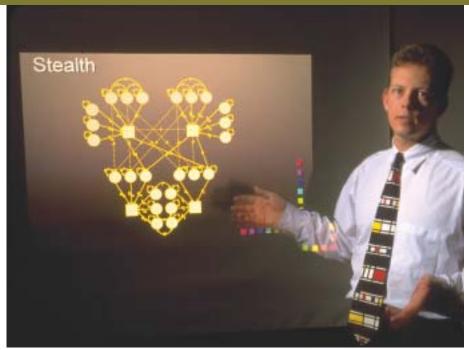


## The VCU Medical Center

One of the nation's oldest transplant programs, founded in 1956, is housed at the Virginia Commonwealth University Medical Center, one of the nation's leading medical centers. The medical center includes an 820-bed hospital, outpatient clinics, and a 600-physician-faculty group practice, as well as the VCU health sciences schools of Allied Health Professions, Dentistry, Medicine, Nursing and Pharmacy.

- The VCU Medical School's Department of Pharmacology and Toxicology ranks in the top 10 of NIH funded Pharmacology and Toxicology programs in the country.
- VCU's School of Pharmacy, established in 1898, is rated among the nation's top professional graduate programs and is at the scientific forefront in Pharmacy, Pharmaceutics and Medicinal Chemistry.
- VCU is a leader in living liver donor transplantation and the treatment of liver disease, including Hepatitis B and C and nonalcoholic fatty liver disease.
- Supported by NIH funding, VCU researchers are testing potential new drugs as alternatives to chemotherapy for multiple myeloma, chromic myeloid leukemia, and other cancers and are participating in a clinical trial comparing the effectiveness of virtual colonography screening for colorectal polyps.
- VCU researchers have developed an innovative laboratory test that quickly measures the amount and speed at which thrombin is produced in patients' blood, which could help clinicians target drugs to control a range of bloodclotting problems.





Researchers at VCU School of Pharmacy (left) and at Institute for Psychiatric and Behavioral Genetics (right). Photos: Allen Jones, VCU Creative Services

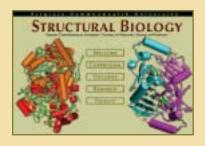
# Pharmaceutical Trials and Testing

- Clinical Trials Institute and Outcomes Research Institute provides a center to attract and work collaboratively with the pharmaceutical industry on a wide variety of Phase I - IV clinical trials. There are currently more than 100 clinical trials underway.
  - www.trials-outcomes.clt.vcu.edu
- Center for Drug Studies, a fully staffed 50-bed facility in the School of Pharmacy, is one of the largest academic Phase I clinical research centers in the country. Industry sponsors include many of the nation's leading drug companies including Pfizer, Merck, Roche Pharma, Wyeth and Genecom.
  - www.cds.vcu.edu
- Institute for Structural Biology and Drug Discovery, established in May 1997, links structural biology, molecular medicine, biotechnology and drug design to produce new medicines.
  - www.vcu.edu/structuralbio

- Institute for Psychiatric and Behavioral Genetics combines the strengths of the VCU School of Medicine's departments of psychiatry and human genetics to study the role of genes and environment in psychiatric illness and behavior. The institute includes the Mid-Atlantic Twin Registry, one of the largest twin registries in the world. www.vipbg.vcu.edu
- McGuire Research Institute at McGuire Virginia Medical Center is a non-profit organization associated with the Richmond Veterans Administration Medical Center—a 500-bed tertiary referral hospital. The institute supports investigators with faculty appointments who conduct inpatient and outpatient Pre-clinical, Phase I, II, III, and IV trials and outcomes research. Currently, 70 investigators are conducting 170 projects.

www.centerwatch.com/professional/PRO7.html

MCV Hospitals was named one of the Solucient 100 Top Hospitals in the United States for 2002, one of only 16 major teaching hospitals in the United States selected for the honor.









## **Medical Research and Clinics**

- Medical Informatics and Technology Applications Consortium is a NASA-funded commercial center with industrial, academic and government partners and a focus on telemedicine, medical informatics and medical technologies.
  - www.surgery.vcu.edu/res-mitac.htm
- Center for Bioelectronics, Biosensors and Biochips (C3B) has a focus on gene chips used for detection and measurement of targeted DNA and RNA sequences in applications such as diagnostics. www.vcu.edu/egrweb/biochips
- General Clinical Research Center has received continuous funding through the National Institutes of Health since 1962. The center, one of more than 70 nationwide, supports clinical investigation into the pathophysiology of human disease and the testing of new methods of diagnosis and treatment. This smaller research hospital within the larger medical facility includes 10 inpatient research beds, outpatient space and a cadre of highly skilled research personnel. www.vcuhealth.org/crc
- Massey Cancer Center, the focal point for basic and clinical research, education and cancer health delivery activities at VCU, has received continuous funding from the National Cancer Institute since 1975, when it was designated as a clinical cancer center. More than 90 center members from 25 academic departments are involved in collaborative research activities. The center also operates shared laboratory resources for VCU's basic scientists.

www.vcu.edu/mcc/

■ Hume-Lee Transplant Center, an international leader in organ transplantation since 1956, had one of the nation's first kidney transplant programs. It was the first in the U.S. to perform adult-to-adult living liver transplants. The center also performs simultaneous kidney/pancreas transplants. www.vcuhealth.org/transplant



Massey Cancer Center. Ground was broken in September 2003 for a \$28.5 million, 60,000 square foot research addition to the existing building.

Photo: Allen Jones, VCU Creative Services

## Other Life Sciences

- Center for Study of Biological Complexity is a faculty think tank that supports significant research activity in forensic science and developmental biology and coordinates research capabilities in bioinformatics, genomics and proteomics, with a specific focus on microbial genomics and developmental biology.
  www.vcu.edu/csbc
- Center for Environmental Studies, the focal point for environmental science at VCU, emphasizes the importance of the life sciences through innovative research, hands-on teaching and community service. More than 40 faculty members mentor talented undergraduate and graduate students in environmental studies.

www.vcu.edu/cesweb

## **Regional Research Institutions**

**Thomas Jefferson National Accelerator Facility** (Jefferson Lab) is a Department of Energy facility for basic and applied nuclear physics research and home to the Continuous Electron Beam Accelerator Facility and the Free-Electron Laser.

www.jlab.org

NASA Langley Research Center conducts research in aerospace, atmospheric sciences and technology commercialization and is home to the Wind Tunnel Enterprise.

www.larc.nasa.gov

**Virginia Modeling Analysis and Simulation Center** at Old Dominion University provides academic support for military and civilian modeling and simulation activities.

www.vmasc.odu.edu











### **Richmond Firsts**

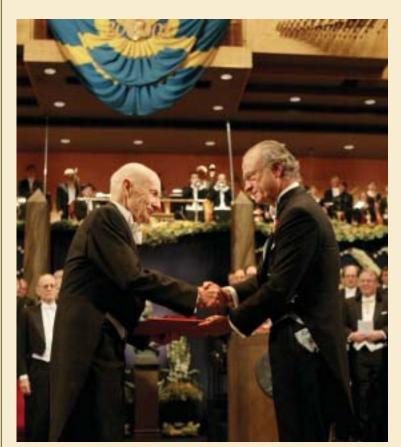
- First Hospital In 1611, America's first hospital, a "guest house for sick people," was built at Henricus, the Richmond area's first major English settlement.
- First Tobacco John Rolfe planted the first crop of tobacco just east of Richmond in 1612, after observing Native Americans cultivating tobacco.
- First Iron In 1619, the nation's first ironworks were established at Falling Creek in Chesterfield County.
- First Coal The nation's first coal mining began in the mid-1700s in the Richmond area.
- Oldest Medical College Building in the South -The South's oldest medical college building is the Egyptian Building of Virginia Commonwealth University's School of Medicine, built in 1845.
- First Electric Streetcar In 1888, Julian Frank Sprague put into operation the first commercial streetcar system powered by overhead electric lines from a central station.
- First Cellophane DuPont produced the nation's first cellophane in Richmond in 1930.
- First Clinical Transplant Center In 1962, MCV Hospitals opened the first Clinical Transplant Center (CTC), which remains the oldest unit of its kind in the United States.
- First Recyclable Can Reynolds Metals Company (now Alcoa) developed the recyclable allaluminum can in 1963 in Richmond.
- First Transplant Matching System In 1969, MCV Hospitals and Duke University collaborated with six other regional medical centers to establish the Southeastern Organ Procurement Foundation (SEOPF), which became the nation's first computerized donor-recipient-matching system for kidney transplants.
- First ISDN Phone Service C&P Telephone, headquartered in Richmond (now Verizon), pioneered the nation's first commercial (non-trial) Integrated Services Digital Network (ISDN) in 1988.
- First Forensic DNA In 1989, Virginia's Department of Forensic Science was the first state laboratory to offer DNA analyses to law enforcement agencies and the first to create a DNA databank of previously convicted sex offenders.

## 2002 Nobel Prize for Chemistry

Professor John B. Fenn, a research professor in the Department of Chemistry at VCU and an affiliate professor of chemical engineering, is one of three recipients of the 2002 Nobel Prize in Chemistry.

Fenn was honored for his work in the field of mass spectrometry, specifically an analytical method that he published in 1988 called electrospray ionization. The pioneering technique allows researchers to "weigh" large biological molecules, such as proteins, with unprecedented accuracy.

The technique is used in chemistry laboratories around the world to rapidly and simply reveal what proteins a sample contains, contributing to the development of new pharmaceuticals.



Dr. Fenn (left) of VCU in mid-December received the Nobel Prize in chemistry from King Carl XVI Gustaf of Sweden at the Concert Hall in Stockholm.

# A Region with 10 Institutions & 7,000 Degrees

Greater Richmond is fortunate to have workforce development supported by two strong, well-established community colleges. J. Sargeant Reynolds Community College, the third largest in the state's 23-member community college system, and John Tyler Community College both offer AS and AAS degrees, certificate programs and credit and non-credit classes in occupational and technical areas at seven campuses and outreach locations around the region.

The Community College Workforce Alliance is a partnership between the two colleges to provide a single source to meet the region's workforce development and economic development needs. Services include noncredit classes, custom training programs for individual companies and Work Keys job profiling and skills assessment.

New programs, created in response to local industry needs, include:

- Biotechnology, Chemical, and Engineering Technology
- Semiconductor Manufacturing Technology
- Machine Technology/High Performance Manufacturing
- Information Technology Certifications
- Customer Service Academy

Four-year colleges located in the Richmond metro area include Randolph-Macon College, University of Richmond, Virginia State University and Virginia Union University. These schools provide a variety of excellent undergraduate and graduate programs in arts and sciences, leadership studies, engineering, business and law.

Overall, 10 institutions award 7,000 degrees each year in a full range of disciplines and degree levels. There are also strong evening and continuing education programs for working adults. Local educational institutions have a history of anticipating and responding to industry's training needs.

Higher Edu	cation Enrollment in Greater Richmond, Fall 2002			
38,213	Four-Year Institutions			
18,539 Two-Year and Special Institutions				
2,450	Private For-Profit Institutions			
57,202	Total Enrollment			

## **Around the Commonwealth**

Virginia is renowned for its excellent institutions of higher education. Schools offering additional sources of potential new employees, as well as opportunities for collaborative research, adjunct faculty positions and other partnerships with industry in their specific areas of expertise include:

- University of Virginia in Charlottesville
- Virginia Tech in Blacksburg
- George Mason University in Northern Virginia, and
- Old Dominion University in Norfolk



**An Education That Works** 



Virginia State Capitol designed by Thomas Jefferson.
Photo: John Maziarz. VCU Creative Services

## **Business Advantages in Greater Richmond**

# A Region That's Easy to Love

Virginia is synonymous with gracious living, and the Richmond region is proud of its unparalleled quality of life. A culture rich in history, the arts, recreational opportunities, exceptional schools and activities for children, and numerous vibrant neighborhoods make Richmond an "easy sell" to top-level professionals and managers.

The area's outstanding quality of life helps companies recruit, relocate and retain all the right people to meet current and future needs. Firms that have relocated to Richmond are pleased with the broad range of housing available at relatively low costs. From historic townhouses and Georgian colonials to contemporary clusters, in urban or suburban neighborhoods, there is a full range of desirable housing options and top schools, both public and private.

Best of all, the average commute time is only 24 minutes. Amazing!

Here are more reasons why Richmond is easy to love.

- Workers' compensation and unemployment compensation costs are among the lowest in the nation.
- Building costs are 16 percent below the national average.
- Dominion Virginia Power offers a variety of rate options and incentive rates for industrial users. Users have the option of selecting competitive power providers and base rates will not increase until 2007 under Virginia's deregulation legislation.
- Lease rates for suburban high tech/R&D space are in the range of \$6 to \$9 per square foot.
- Lease rates for Class A suburban office space average \$16 to \$20.
- The average price of a new middle management home is \$222.657.

Cost Comparison						
Metro Area (MSA)	Cost of Living Index	Middle Management Home Price Comparison	Building Cost Index	Net Lease Rates, Suburban High Tech/R&D (\$/SF)	Net Lease Rates, Suburban Class A Office (\$/SF)	Electricity: Industrial Average Rates (Cents/KwH)
Richmond VA	100.4	\$222,657	83.8	\$6.00-\$9.00	\$16.00-\$20.00	\$.0433
Austin TX (San Marcos)	92.2	\$216,000	79.7	\$8.67	\$18.00-\$25.88	\$.0413
Boston MA	137.7	\$440,044	115.0	\$9.00	\$24.00-\$35.00	\$.0809
Los Angeles CA	138.2	\$530,598	107.5	\$16.32	\$16.20-\$30.00	\$.0879
Northern NJ	145.2	\$485,743	109.5	\$10.00	\$18.00-\$32.00	\$.0721

#### Sources:

Raleigh NC

San Jose CA

Washington DC

(1) ACCRA Cost of Living Index, First Quarter 2003. Average of 300 urban areas = 100.

\$234,992

\$661,667

\$412,894

(2) ACCRA Cost of Living Index, First Quarter 2003. Price for 2,400 sq. ft. living area new home with 8,000 sq. ft. lot in urban area with all utilities.

\$8.00-\$10.50

\$12.00

\$9.00

(3) RS Means Building Construction Cost Data 2003. Weighted average total city cost index. Average for 30 major U.S. cities = 100.

75.7

119.7

95.7

- (4) 2003 Comparative Statistics of Industrial and Office Real Estate Markets, Society of Industrial and Office Realtors.
- (5) Typical Bills and Average Rates Report, Winter2003, Edison Electric Institute.

## Virginia State Taxes

98.7

162.2

134.7

The Commonwealth of Virginia offers a welcoming business environment with moderate and stable tax rates and low operating costs. A long-term commitment by pro-business state and local governments has kept tax rates stable and among the lowest in the country. Virginia's corporate income tax rate is 6 percent. The rate has not changed since

1972 and there is no local corporate income tax. At a 4.5 percent total rate, Virginia's sales tax rate is the seventh lowest in the nation. Broad sales tax exemptions for business include all purchases used directly in production; gas, electricity or water delivered through mains, lines or pipes; and custom computer software.

\$16.00-\$23.00

\$19.20-\$42.00

\$15.00-\$33.00

\$.0425

\$.0917

\$.0494

State	Corporate Income Tax	Personal Income Tax	Sales Tax
Virginia	6.0%	2.0-5.75%	4.5%
California	8.84%	1.0-9.3%	7.25%
Massachusetts	9.5 % plus \$2.60 per \$1,000 on tangible values or net worth	5.3% plus 12% on short-term capital gains	5.0%
New Jersey	9.0%	1.4-6.37%	6.0%
North Carolina	6.9%	6.0-8.5%	6.0%
Texas	Franchise Tax: 0.25 % of net taxable capital, plus the difference between 4.5% of net taxable earned surplus and the tax on net capital	None	8.25%*
Washington DC	9.975%	5.0-9.3%	5.75%

## **Local Cultural Literacy**

- Monument Avenue, the longest continuous stretch of masonry homes in America
- The **James River**, one of the few urban whitewater rivers in America with Class IV rapids
- Shad roe and bacon in late March
- Garden Week, always the fourth week in
- **The Riverfront**, newly renovated
- Shockoe Slip, with cobblestone streets lined with boutiques and gourmet restau-
- Shockoe Bottom, anchored by the Farmers' Market and Main St. Station, with jazzy restaurants and music venues
- **Carytown**, blocks and blocks of hip little stores and unusual eateries
- The James River Park System, with 400-some acres flanking the river
- **First Fridays**, when galleries and studios all over the city are open for evening viewing
- Soft shell crabs in May
- Concerts at Brown's Island, Mayo Island, Kanawha Place, Dogwood Innsbrook, Boulders and the Virginia Museum of Fine Arts
- The VCU French Film Festival, the largest in the country
- Historic Jackson-Ward, Harlem of the South on the rise
- **Ukrop's**, where it's all about Southern hospitality in one of the best grocery chains in the country
- Strawberry Hill Races, steeple chases and world-class tailgating
- Fulton Hill Studios, artist studios in a renovated school
- The State Capitol, designed by Thomas Jefferson

## **Local and State Incentives**

#### Richmond Region incentives include:

- Infrastructure improvement incentives including road access, utility extensions and connection costs, and off-site improvements will be negotiated by individual localities.
- **Enterprise Zones** in Chesterfield, Henrico and the City of Richmond offer local tax and financing incentives in addition to the state's Enterprise Zone incentives.
- Foreign Trade Zone #207 at Richmond International Airport provides space for storage, distribution and light assembly operations. Imported goods held in the zone are not subject to U.S. Customs duties until they leave the zone and enter the U.S. for domestic consumption. Duties are not paid on broken or wasted product or on items that are exported.
- Financing for small businesses is available through the James River Certified Development Corporation, the Crater Development Corporation and the City of Richmond's Micro Enterprise Program.
- **Dominion Virginia Power** offers a variety of rate options and incentive rates for industrial users.
- Relocation services for company personnel are available through the Greater Richmond Partnership, Inc. and local businesses.

#### Virginia incentives include:

- Workforce Services training program for companies hiring at least 25 new employees and investing at least \$1 million and with at least 50 percent of revenue generated from outside of Virginia.
- Major Business Facility Job Tax Credit against corporate income tax of \$1,000 for each new job created over 100 jobs (over 50 jobs in Enterprise Zones and high unemployment areas).
- **Enterprise Zone** program provides corporate income tax credits based on new jobs and investments, as well as job grants for new jobs created.
- Financing programs include industrial revenue bonds for manufacturing projects, Governor's Opportunity Fund, incentive grants for targeted industries and small business programs.







Virginia BioTechnology Research Park's Biotech Center and Biotech One (left), Virginia Division of Forensic Science laboratory (center) and UNOS headquarters (right).

Photos: Allen Jones, VCU Creative Services (left) and Virginia BioTechnology Research Park (center & right)

## Infrastructure & Support

# Technology Parks

#### Virginia BioTechnology Research Park

Adjacent to the VCU Medical Center and the downtown campus of J. Sargeant Reynolds Community College, this 34-acre technology park is targeted to the pharmaceutical and life sciences industries. When fully developed, the \$250 million park will accommodate more than 3,000 scientists and support personnel in 1.5 million square feet of leased office and laboratory space. The park is home to 45 biosciences companies, research institutes affiliated with the VCU Medical Center, and major state and national medical laboratories and organizations involved with forensics, testing of biotoxins and management of the nation's organ transplantation process.

www.vabiotech.com

#### These unique organizations are tenants in downtown Richmond's Virginia BioTechnology Research Park:

- UNOS, the United Network for Organ Sharing, administers the nation's only Organ Procurement and Transplantation Network (OPTN), established by the U.S. Congress in 1984. UNOS collects and manages data about all U.S. transplants, facilitates the organ matching and placement process and brings together medical professionals, transplant recipients and donor families to develop organ transplantation policy.

  www.unos.org
- Virginia's Office of the Chief Medical Examiner and Division of Forensic Science (DFS) lead the nation in the use of DNA in crime solving. In 1989, DFS was the first state laboratory to offer DNA analyses to law enforcement agencies and the first to create a DNA databank of previously convicted sex offenders. In 1994, a "cold hit" from the DNA databank resulted in a conviction and Virginia became the first state to discontinue traditional serology in favor of DNA testing. In 1998, Virginia's DNA databank identified a perpetrator in Florida for the first interstate "cold hit." www.dfs.state.va.us
  - www.vdh.state.va.us/medexam
- Virginia's Division of Consolidated Laboratory Services (DCLS) will be one of five laboratories in the United States equipped with Biosafety Level 4 (BSL4) lab space specifically designed to meet worldwide standards for safely handling the most dangerous pathogens. Formed in 1972, DCLS was the first consolidated laboratory in the nation to offer a wide variety of scientific testing in support of state programs. <a href="http://dcls.dgs.state.va.us">http://dcls.dgs.state.va.us</a>



#### Meadowville Technology Park

This 1,600-acre park is located at the intersection of Route 10 and I-295 in Chesterfield County, with frontage along the James River. The park is a satellite campus for the Virginia BioTechnology Research Park, providing the capacity for approximately 2 million square feet of combined office, laboratory and manufacturing space. The neighboring River's Bend Center is already home to Canon Semiconductor, Hewlett Packard, Capital One and ERNI Components. www.meadowville.com

#### White Oak Technology Park

Located in one of the fastest-growing technology communities in the country, this Henrico County park is a satellite campus for the Virginia BioTechnology Research Park, totaling 2,300 acres. Conveniently accessible at the southeast quadrant of I-295 and I-64, the park is zoned for high-tech, high-value manufacturing, R&D and office uses, with sites ranging from 10 to 765 acres. Infineon Technologies and Hewlett Packard are anchor tenants.

## **Incubators**

www.whiteoak.com

#### **Bioscience Incubator and**

#### Virginia Biosciences Development Center

www.vabiotech.com/bioincubator

The Bioscience Incubator is a 27,000-square-foot incubator located at the Virginia BioTechology Research Park. Since its founding in 1996, more than 50 companies have started in the incubator, including 18 from VCU. Sixteen have successfully graduated, with six having relocated to larger space in the park. Three companies — Insmed Inc., Allos Therapeutics Inc. and Commonwealth Biotechnologies, Inc. — are now publicly traded firms. The Virginia Biosciences Development Center (VBDC), a nonprofit 501(c) (3) corporation, provides business strategy and assistance to incubator tenants.

#### AdvanTech

AdvanTech is an incubator with furnished office space for up to 160 new businesses to grow during their one- to three-year start-up phase. Rental rates are below market rate and features include multiple phone lines with voice mail, high-speed Internet access and training and conference rooms. <a href="https://www.advantechva.org">www.advantechva.org</a>

#### **Richmond International Business Center**

This center offers foreign companies the resources they need to quickly and successfully establish operations in the U.S. "How to do Business in the U.S." workshops provide a comprehensive overview of the legal, banking, financial, marketing and human resource issues of a U.S. start-up. The center features amenities such as T1 Internet connection, line and voice mail, shared conference rooms and reception area, access to video conferencing facility, voice over IP and a training room that seats up to 100.

www.incubator-usa.com

## **Specialized Office Facilities**

#### Rivers Bend East Office and Technology Center

This campus-style 42-acre complex is located adjacent to Chesterfield County's Meadowville Technology Center, off I-295 and minutes from I-95. The most unique feature is 61,400 square feet of laboratory space containing 47 laboratories — half wet and half dry. In addition, there is 50,700 square feet of conditioned process pilot/scale up space. The 139,000-square-foot office building includes a cafeteria, lecture hall and training and fitness centers.

www.riversbendeastotc.com

#### **Innsbrook Technology Center**

The former home of Dominion Power features a four-story, 417,042-square-foot office building with a 10,677-square-foot mechanical penthouse plus a 4,169-square-foot vehicle maintenance building. Expansion capability is to at least 1,200,000 GSF. There is parking for 1,903 cars and 60 additional acres for expansion. Special features include a 500-person auditorium, 150-foot microwave tower, two 1,500 kw backup generators and helipad.

www.innsbrooktechnologycenter.com

#### Jefferson Davis Enterprise Center-Chesterfield

This multi-use incubator has industrial and office space available for lease. Tenants share administrative services and common areas, including a conference room. The center can also provide business counseling, training courses and general business advisory services at no charge. The 50,000-square-foot center is ideally located off I-95 in Chesterfield County's Jefferson Davis Enterprise Zone.

www.jedc.net

# **Entrepreneurial Support**

#### **Greater Richmond Technology Council**

The Greater Richmond Technology Council is a membership association of companies and organizations that promotes the success of technology companies and the technology sector of the Central Virginia economy. The Council provides a forum for technology companies to exchange ideas and serves as an advocate on technology issues. The Council's Capital Access Committee creates a "critical mass" of venture activity through the cooperation among similar organizations along the I-64 Corridor, from Hampton Roads to Charlottesville.

www.richtech.com

#### **Greater Richmond Small Business Development Center**

The SBDC partners with Richmond area small businesses to provide high quality business counseling, education and information services in areas including financing, marketing and business planning. The SBDC offers success workshops and seminars and maintains a broad selection of resource materials. The SBDC is operated by the Greater Richmond Chamber of Commerce, in partnership with the Virginia Department of Business Assistance and the U.S. Small Business Administration.

www.grsbdc.com

#### Virginia's Center for Innovative Technology

The Center for Innovative Technology's mission is to increase Virginia's commitment to the creation of new knowledge, accelerate the transfer of that knowledge into the marketplace and promote the growth of entrepreneurial firms. Created by the Virginia General Assembly in 1984, CIT is a non-profit organization designed to enhance the research and development capability of the state's major research universities. CIT works to increase federal research funding to colleges, universities and industry; commercialize intellectual property from colleges and universities; grow entrepreneurial companies; and promote technology-based economic development. Its Entrepreneurship Program offers new technology companies access to markets, capital and experienced mentors.

www.cit.org

#### Virginia Council of CEOs

The Virginia Council of CEOs is a nonprofit business organization for CEOs who seek to grow their companies aggressively by leveraging the knowledge and experience of their peers. The Council brings together dynamic, entrepreneurial CEOs of second-stage, rapidly growing companies to share ideas, experiences and solutions through networking and educational events.

www.vaceos.org

## **Get Help Here**

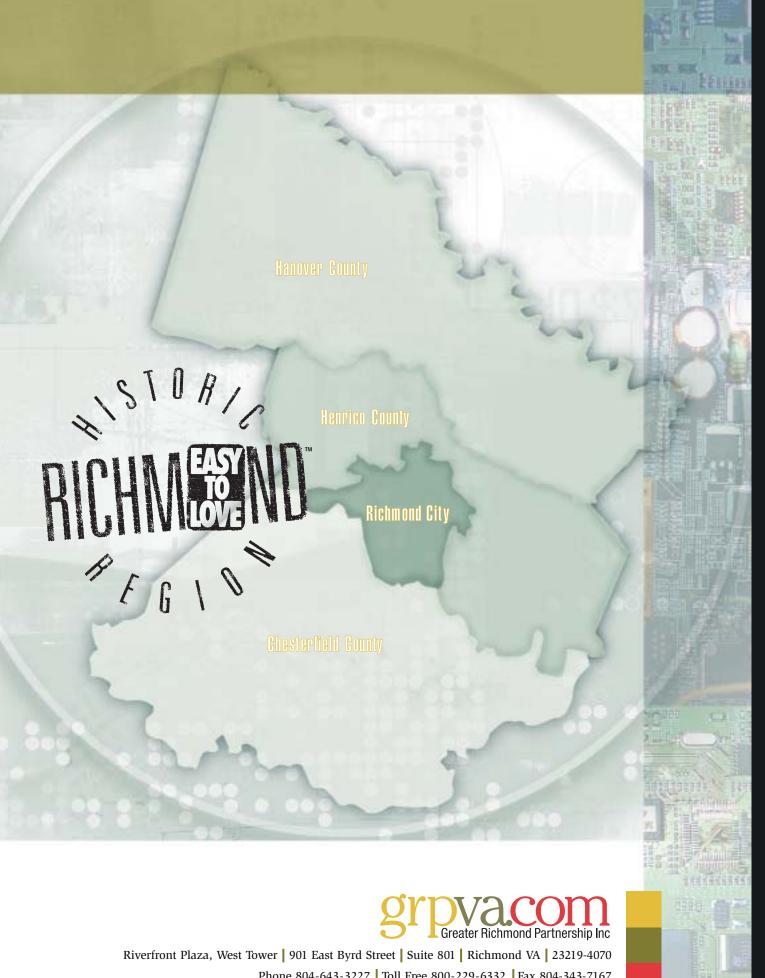
The Greater Richmond Partnership, Inc. is an economic development team representing the City of Richmond and the counties of Chesterfield, Hanover and Henrico.

The Partnership provides site location assistance to domestic and foreign companies planning new or expanded facilities. It is a single point of contact to the network of private sector and state and local government professionals that supports a company's facility location decision.

At the start of the site selection process, the Partnership provides real estate information and customized economic and business information as requested by the company. In addition to the continuously updated and extensive business real estate database, the Partnership's research department can provide information on critical business factors, including:

- Labor availability and cost and labor-management issues
- Education and training programs
- Utilities
- Taxes and incentives
- Existing industry and suppliers
- Business climate and costs
- Quality of life and cost of living

The Partnership will coordinate public relations services for the company and provide relocation services to assist executives and employees.



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